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THE GAS PIPING IN THE BANKER'S CLUB, EQUITABLE BUILDING, NEW YORK.

By C. F. HERINGTON.

It was in 1870 that the first passenger elevator was installed in New York city, in the old Equitable Building, at Broadway and Cedar street. To-day there is being finished on the same site a building that contains a total of fifty (50) elevators, which is more than in any other building in the world.

It was designed by D. H. Burnham & Co., architects, of Chicago, Ills., and erected by the Thompson-Starrett Co., of New York city. This building leaves one at a loss for words to describe its vastness, although some slight idea of its size may be obtained by comparison with the Municipal and Woolworth Buildings. The Municipal Building weighs 188,000 tons, the Woolworth Building, 103,000 tons, and the Equitable 203,000 tons. The total cost of the land, buildings and carrying charges will approximate $30,000,000, and the building contains 2,500 offices.

Of more than particular interest is the kitchen equipment of the Banker's Club, which occupies the 38th and 39th floors. All of this equipment was furnished and installed by Duparquat, Huot & Moneuse Company, of New York, who are responsible for many sanitary and well arranged kitchens in the city, and the gas piping was installed by the well known plumbing firm of James P. Knight & Son, of 136 West 50th street.

There is a separate 4" gas service taken off the main in Pine street, and run direct to the 38th floor, to supply the kitchens on the south side of the building. For the general house supply there is a 3" service from the main in Pine street; and from a 3" service from Cedar street, a $2\frac{1}{2}$" separate service is run direct to the kitchen on the north side of the building. These two general services are cross-connected in the basement, and run up through the building to supply outlets at each stairway on every floor for emergency lights, and also supply outlets in the elevator machinery rooms.

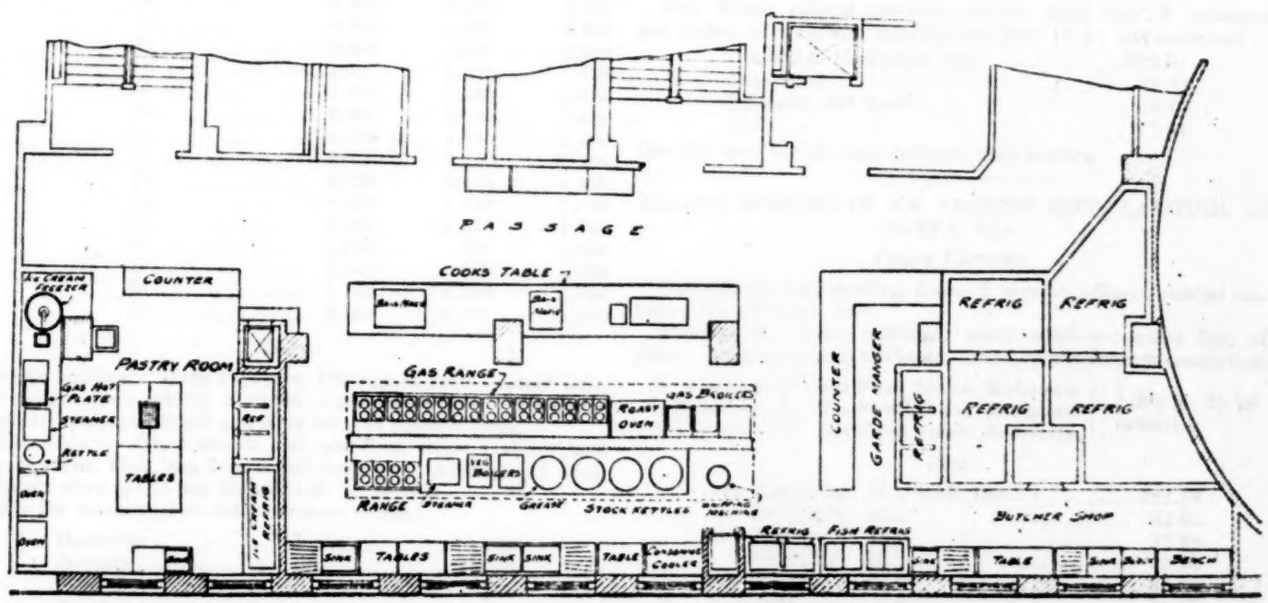
Every branch gas pipe taken from a riser if furnished with a cock, and the pipes are firmly secured in place and special care was taken to see that no pipes were trapped in any way. All of the pipes were bedded so that they do not give or spring under tread. Wrought iron pipe and malleable fittings were used throughout.

Piping in partitions was tested before partitions were finished, and each supply pipe was tested with air and all leaking fittings were taken out and made over, no cemented or caulked joints being permitted on the job. The piping throughout, after being tested and made tight, was coated with asphaltum. All the services coming into the building are separately metered and provided with a cock on each side of the meter, and one on each supply line.

There are four (4) kitchens for the club; the Grill kitchen and Service kitchen on the 38th floor, and the Main kitchen with the Private kitchen on the 39th Mezzanine floor.

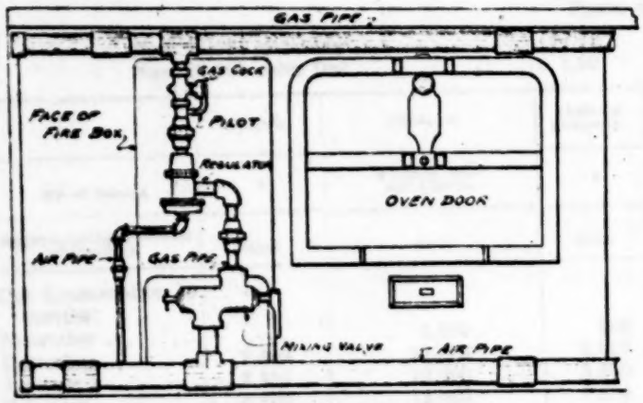
One of the most interesting features of the installation, and unlike any other club kitchen in the city, is that one of the ranges in the Main kitchen is equipped with an apparatus known as the "Rex-Ray" surface-combustion burner, the method of applying it to a coal range being shown in the cut.

The installation consists of six (6) sections of "Imperial" French range, each section being 4 feet long with ovens $21\frac{1}{2}$" x 28" x 16", the usual coal range size; and on the grate in this range there is placed a "surface-combustion" burner connected to the gas supply, and an air supply.



Plan of Main Service Kitchen—Banker's Club.

The burner is one of those designed by Professor Lucke, and the description of its operation is taken from his paper to the American Gas Institute in 1913.



ARRANGEMENT FOR REX-RAY BURNERS

"The new process assumes that gas to be burned should be supplied with no more air than will supply the required amount of oxygen for the combustion reaction, and that the air and gas are thoroughly mixed previous to combustion, so that the reaction may take place instantly, once the ignition temperature is reached. Premixture is desirable because thereby each particle of fuel may be brought into intimate contact with its required oxygen before it is needed, instead of depending on the accidental dissipation of the products formed on the edge of a flame jet, before the central core of gas can secure air from a surrounding and supporting atmosphere. This premixture of air and gas in combining quantities, insures protection against two important sources of loss in combustion; that due to excess air, and that due to incomplete combustion. Another advantage, of no less importance, is the development of the heat of combustion in a form better available for absorption by the bodies to be heated. The heat taken from a fire by direct contact of the absorber with the hot gaseous products, is absorbed at a rate directly proportional to the excess of the temperature of the gases over that of the absorber; so the hotter these gases are, the more heat will a given absorbing body take up, other things being equal. Heat is, however, much more rapidly absorbed when the source is radiant, because radiant heat readily pierces the insulating dead gas films adhering to the surface of the absorber and resisting by its low thermal conductivity transmission from passing hot gas streams. The superior transmitting value of radiant heat has been well known as long as physicists have studied the sun's rays; but it has been lacking in most gas burners because of the very low radiant value of hot gases as compared with solid bodies at the same temperature. The premixture of the gas and its supporting air makes it very easy to secure a large proportion of the heat of combustion in a radiant form, because, being entirely dependent of the atmosphere into which the products may be discharged, the combustion can be carried on behind layers of solid granules, in the crevices between them, in holes in solid plates, or behind solid plates of any convenient form, all of which, attaining the temperature of the gaseous products of combustion, radiate heat at a rate immensely superior to that of the gases themselves.

"The peculiarity of such mixtures that renders control difficult, is the property of self-propagation of flame through them, bringing them into the class commonly termed explosive. As all the mixture is in condition suitable for combustion as soon as the ignition temperature is reached, and as the combustion temperature is much in excess of that of ignition, the burning of even a minute quantity of mixture at a point of ignitian, will promptly heat neighboring layers of mixture above ignition temperature, so that the flame will be propogated through the whole mass. The only way such self-propagation can be stopped is by preventing the heating of fresh layers by the combustion of their neighbors. This is accomplished by heat absorption by some solid screen, without the screen itself becoming hot enough to heat the mixture on its other side to the ignition point. It is easy to make flame interrupting screens that will stop the propagation of flame through an explosive mixture once or twice, but difficult to make them continue to do so indeffinitely. With the exception of the internal combustion engine, gas burning apparatus requires a continuous burning of gas as supplied, in a definite place, termed the burner or furnace. When explosive gaseous mixtures are supplied to such continuous fires, the property of self-propagation operates to prevent localization of the combustion, unless specific means are provided to make the treatment of the mixture conform to its physical properties. For any given mixture there is a definite normal rate of propagation, which may be equal to, or less or greater than the velocity of flow of the mixture into the fire; and it is clear that localization of combustion will depend primarily on the relation of the rate of flame propagation to that of flow. If they are equal, that is, if the flame can burn back toward the source of mixture supply just as fast as, but no faster than, the mixture reaches the flame, then the flame will remain fixed, or be definitely localized. In fact, the above is the primary condition for localization of the combustion of explosive mixtures, because otherwise the flame would travel back to the source of supply or be blown out by the physical pushing away by the faster flowing stream of mixture. Of course localization may also be secured if the mixture be fed through a flame interrupting partition at a flow rate inferior to that of propagation, in which case the localization takes place on the face of the partition, which must have a large capacity for heat absorption, which means in effect, that it must be able to dissipate or transmit to some other body the heat it is receiving, or otherwise it would raise in temperature to the point where it, by igniting the mixture on the supply side, ceases to be an interrupter."

Burning Watered Coal.

It is not unusual in a small power plant to see a fireman wetting the coal. If asked why he does it, he will say he does not know, or perhaps that it makes the coal burn better. In some large power stations the same thing is done, but here it is not one man's fancy but a regular routine operation, the coal cars being brought under a stream of water. When the operator is asked why the water is used, his answer is little different from that given by the man in the small plant. He may be a little more explicit and say that since water contains hydrogen and oxygen, the coal takes the oxygen from the water and liberates the hydrogen, which can thus be burned in the furnace. This may occur under suitable conditions, but the answer does not satisfy the questioner, who desires to know if there is a gain in heat through the practice.

A little common-sense consideration will show that there can be no gain in heat; in fact, there is a loss as a result of watering the coal. This is obvious when it is remembered that the amount of heat required to separate the hydrogen of the water from its oxygen is absolutely the same as that obtained by the complete combustion of the hydrogen in the furnace, and if any of the hydrogen is liberated unburned from the caimney, which is quite likely to occur, there must obviously be a loss of heat. There is, besides, another loss of heat; when the hydrogen is burned it is transformed into water vapor, and in this way the water added to the coal passes up the chimney in the form of steam, and the heat units required to convert this water into steam at atmospheric pressure and superheat it to the temperature of the flue gases is thus a real heat loss.

Moisture is deleterious in coal as a fuel; it lowers the thermal efficiency of the fire and increases the cost per ton for haulage. It is for these reasons that specifications for the purchase of coal stipulate the maximum percentage of moisture that will be allowed.

When coal is damp, however, the very small lumps and particles of dust tend to cling together and are not blown up into the chimney unburned, as often occurs with forced draft and high air velocities. Blowing cinders and dust particles from the top of the stack is not only inefficient, but is annoying to those living close to the power plant, because of the dirt thrown down; and this is about the only logical reason for wetting coal. Many central-station firemen claim that dampened coal makes less clinker than undampened coal, and that the clinker is softer and less troublesome to remove. If this is true the coal is dampened for physical rather than chemical reasons, and not to gain heat.

It is important to remember that when chimney gases are liberated direct they have a temperature of 300° and above, whereas when economizers are used the gases may be cooled down to below 212°. In this way the steam in the gases is condensed and its latent heat of evaporation utilized; and under these circumstances some of the heat required to evaporate the water used for dampening coal is used.

—"Electrical World."

HOUSE HEATING BY GAS.

[From Report of Committee on Heating, Refrigerating and Ventilation, N. C. G. A.]

Neither refrigeration, nor ventilation by means of gas have progressed sufficiently during the past year to add anything to the report of the 1914 Committee, but we believe that this lack of activity is only apparent and, as the use of gas for such purposes is quite practical, that all possible encouragement should be given to those who are developing systems for these means of gas utilization.

The Committee this year has taken up the question of central-plant house-heating, only for the intermittent heating seasons of Spring and Fall, for which gas fuel is peculiarly adapted. There are, to be sure, isolated cases of long season, central-plant heating but the number is so small that any general conclusion based thereon would probably be fallacious.

If gas is used as fuel during the intermittent heating seasons, coal must be used during the main season, and the gas-fired heater is, therefore, an auxiliary appliance.

The Committee, in collaboration with certain manufacturers of heaters, designed two inexpensive auxiliary heaters, one for hot air, the other for hot water systems. Illustrations of these were sent to numerous gas companies, with the suggestion that they be installed and operated during the Fall and the coming Spring for the purpose of collecting data for future practice. It is too early to predict the results, but it is hoped that the gas companies will give to the 1916 Committee information that will point out the lines to be followed in design and operation, so that this desirable business must bring the returns anticipated.

The following data from actual installations of all-gas heating in various parts of the country are given.

ALL-GAS HEATING IN AN EASTERN CITY, LATITUDE OF NEW YORK.—Price of gas 80c. per 1,000 cubic feet.

Apartments of Four Rooms and a Bath.

Only heat is from a gas fireplace heater and the kitchen, the latter having a combination coal and gas range.

Some gas for cooking is included in the consumption:

		1915.	Gas Consumption—Jan.	Feb.	March.
Apartment No.	1		6,160	3,910	2,880
"	"	2	1,600	1,280	1,200
"	"	3	8,000	4,480	2,880
"	"	4	6,400	4,800	1,440
"	"	5	1,760	1,600	1,840
"	"	6	1,520	2,480	2,640
"	"	7	4,080	1,840	1,520
"	"	8	1,200	1,280	2,080
"	"	9	2,080	1,120	1,280
"	"	10	6,080	4,000	4,240
"	"	11	4,240	4,080	3,440
"	"	12	5,840	3,520	2,640
"	"	13	2,080	1,200	720
"	"	14	2,400	1,280	1,040
"	"	15	6,400	3,120	2,880
"	"	16	3,520	1,840	1,600
"	"	17	3,680	2,240	2,320
"	"	18	3,200	1,440	1,200
"	"	19	1,520	1,840	1,040
"	"	20	3,520	1,440	1,680
"	"	21	1,040	800	1,040
"	"	22	1,440	480	1,600
"	"	23	1,760	1,360	1,760
"	"	24	2,400	2,080	1,200

Cafe.

Inside building. Glass exposure, 183 square feet; exposed wall, 140 square feet; cubical contents, 4,900 cubic feet. Electricity used for lighitng. Small gas stove used at lunch counter.

Installation.—One 8-section high, gas fired steam radiator, and two 4-section high, gas fired steam radiators. Average bill when radiators were not in use, about $4.50 per month.

Bills for months when radiators were in use:

December	$9.52
January	14.64
February	12.00
March	11.60
April	13.04

An average of $12 per month; and deducting $4.50 for gas used for the other purposes, shows $7.50 per month that can be attributed to the gas radiations.

Residence.

This installation has 2,074 square feet of radiation (including radiators and running lines) of the Watson Modulating System, and in addition there is hot water Tank Coil Heater, amounting to about 300 square feet of radiation surface. Cubical contents of house about 105,500 cubic feet. Heated by two 12-horse power gas fired steam boilers. Gas bills from November 25, 1914, to May 17, 1915, amounted to $981.36.

Restaurant.

Inside building, glass front, 15 x 10 feet, cubical contents, 13,350 cubic feet; get some heat from kitchen back of frame partition in rear of store.

Installation.—Three 6-section high, gas fired steam radiators. Kitchen appliances and radiators all on one meter, electricity used for lighting. Average consumption for months when radiators were not in use, about $7.50 per month.

Consumption for months when radiators were used:

December	$14.32
January	23.04
February	19.04
March	17.04
April	18.96

an average of $18.48 per month, or about $11 per month that can be attributed to the gas radiators.

Photograph Studio.

Upper part of inside building. Electricity used for lighting.

First Floor.—Glass, 85 square feet; exposed wall, 266 square feet; cubical contents, 8,000 cubic feet.

Installation.—Three 8 section low, gas fired steam radiators.

Second Floor.—(1 room). Glass, 51 square feet: exposed wall, 130 square feet; cubical contents, 4,400 cubic feet.

Installation.—One 10-section gas fired steam radiator.

Third Floor.—Glass, 95 square feet; top light, 112 square feet; exposed wall, 330 square feet; cubical contents, 8,600 cubic feet.

Installation.—Four 8-section low, gas fired steam radiators.

Total gas consumption from May to November, $16.16; from December to April, $110.64, which shows that the radiators averaged about $20 per month.

Piano Salesroom.

Two floors, cubical contents, 25,740 cubic feet; 7 radiators, gas system with blower, installed October, 1914; gas consumed:

October to December 15th	$29.04
January	31.12
February and March	48.48
April	17.04

Gas was used for no other purpose than heating.

ALL-GAS HEATING IN AN EASTERN CITY, LATITUDE OF TAMPA, FLA.

Cigar Factory.

Two and one-half working floors, 2 private offices; cubical contents, 160,000 cubic feet.

Installation.—Brick building; many windows; 4,600 feet of glass. Large number of workmen. Not permitted much ventilation.

25 8-section 37" Gas Fired Steam Radiators.
3 10-section 37" Gas Fired Sterm Radiators.
6 12-section 37" Gas Fired Steam Radiators.
} 1,208 sq. ft. of radiation.

Cost.

1914	November,	10.0	cubic feet.	$22.18
	December,	33.1	"	42.61
1915	January,	32.9	"	42.39
	February,	25.5	"	32.35
	March,	54.2	"	63.90
	April,	7.9	"	11.43
		163.6		$214.86

ALL-GAS HEATING IN AN EASTERN CITY, LATITUDE OF SAVANNAH, GA.

PRICE OF GAS.

First 10,000 cubic feet. $1.10
Next 20,000 cubic feet..... ..... 1.00
Next 20,000 cubic feet.....$ .90
Over 50,000 cubic feet..... .80

	Church.	Residence.	Clothing Company.	Cigar Store.	Office Gas Company.		Jewelry Company.	Clothing Store.	Ticket Office.
No of Rooms.	1	6 rooms, hall and 2 baths.	1	1	1st floor, 1 room.	2d floor, 1 room.	1	1	1
Approx. cubical contents of Building.	15,000	16,671	24,320	8,250	37,800	38,760	18,900	25,740	8,000
Gas Consumption by months:									
November	....	6,000	800	400	800	200	1,400	000	000
December.....	2,600	16,000	5,000	1,800	12,600	5,000	4,200	5,600	7,400
January.....	2,200	19,000	9,600	4,000	25,600	6,800	7,400	6,100	12,000
February	4,800	13,000	7,200	1,400	20,800	2,400	5,800	5,200	11,000
March.	1,600	12,000	5,000	600	15,600	600	6,000	3,400	7,400
Season 1914-1915. Total.....	11,200	66,000	27,600	8,200	75,400	15,000	24,800	20,300	37,800
Character of Appliances.	4 Gas Fired Steam Radiators.	4 Portable Heaters.	1 Portable Heater.	1 Gas Radiator.	6 Gas Fired Steam Radiators.	6 Gas Fired Steam Radiators.	3 Gas Fired Steam Radiators.	3 Gas Fired Steam Radiators.	3 Gas Fired Steam Radiators.
General Remarks on Installation.	This is the total heat used.	Heat used only in bedrooms occasionally, and one of portable heaters used at such times. No other fuel used.							

NOTE.—The fuel consumption in cu. ft. represents the total fuel used for heating purposes during the entire season of 1914 1915.

CIGAR FACTORY.

Two large working floors, 2 private offices; cubical contents, 96,465 cubic feet.

Installation.—Brick building; many large windows; 1,368 sq. feet of glass. Large number of workmen. Not permitted much ventilation.

1 5-section 37" Gas Fired Steam Radiator.
16 12-section 37" Gas Fired Steam Radiators.
788 sq. ft. of radiation.

Cost.

1914	December,	16.4 cubic feet.....	$22.30
1915	January,	14.1 "	19.18
	February,	14.3 "	19.45
	March,	15.7 "	21.35
	April,	5.3 "	7.69
		65.8	$90.97

CIGAR FACTORY.

Three large working floors, 2 private offices; cubical contents, 263,276 cubic feet.

Installation.—Brick building; many large windows; 3,377 square feet of glass. Large number of workmen. Not permitted much ventilation.

3 10-section 37" Gas Fired Steam Radiators,
30 12-section 37" Gas Fired Steam Radiators,
1,560 sq. ft. of radiation.

Cost.

1914	November,	13.4 cubic feet.....	$18.22
	December,	27.7 "	35.16
1915	January,	13.5 "	18.36
	February,	17.0 "	23.37
	March,	27.3 "	34.68
	April	6.9 "	10.00
		105.8	$139.79

MOVING PICTURE THEATRE.

Cubical Contents, 22,140 cubic feet.

Installation.—Ventilated by usual large suction fans; no ventilation ducts from radiators. Management greatly pleased.

1 8-section Gas Fired Steam Radiator.
1 9-section Gas Fired Steam Radiator.
1 15-section Gas Fired Steam Radiator.
120 sq. feet of radiation.

Cost.

1914	December,	4.1 cubic feet.....	$5.95
1915	January,	5.5 "	7.99
	February,	5.0 "	7.20
	March,	2.2 "	3.19
	April,	3.6 "	5.28
		20.4	$29.61

BANK.

One large banking room; 2 private offices. Cubical contents, 43,740 cubic feet.

Installation.—Nine 10-section gas radiators with blower.

Remarks.—Brick building; 1,064 square feet of glass. Ventilated by windows and transoms. This installation in use for 2 years; had trouble the first year, but was remedied and is successful now.

Cost.

1914	December,	11.5 cubic feet.....	$15.63
1915	January,	14.2 "	19.32
	February,	19.7 "	26.38
	March,	18.6 "	26.10
	April,	17.9 "	25.04
		81.9	$112.47

THEATRE.

Cubical contents, 283,500 cubic feet.

Installation.—Sixteen 6-column tube radiators.

Remarks.—Ceiling ventilators. Gives satisfactory service.

			Cost.
1914 December,	9.9 cubic feet.	.....	$14.36
1915 January,	11.4 "	.....	15.50
February,	10.4 "	.....	14.14
March,	6.2 "	.....	9.09
April,	11.5 "	.....	15.65
	49.4		$68.74

LIBRARY.

Basement and ground floor. Cubical contents, 124,138 cubic feet.

Installation.—Brick building; good construction; 1,410 square feet of glass. No ventilation except windows and transoms. Installed in spring of 1915.

7 8-section Gas Fired Steam Radiators.
6 10-section Gas Fired Steam Radiators.
12 12-section Gas Fired Steam Radiators.
} 1,040 sq. ft. of radiation.

ALL-GAS HEATING IN AN EASTARN CITY, LATITUDE OF WORCESTER, MASS.

Price of gas, 75 cents per 1,000 cubic feet.

Residence—13,000 cubic feet contents; 384 square feet radiation; 8 rooms; heated 9 months—September to May; house-heating boiler; 414,500 cubic feet of gas.

Residence.—12,400 cubic feet contents; 300 square feet radiation; 8 rooms; heated 6 months—December to May; house-heating boiler; 283,100 cubic feet of gas.

Residence.—A gas system with blower; 23 rooms; 1 garage; 1 cellar; 29 radiators; heated 9 months—October to June; 550,700 cubic feet of gas.

GAS AUXILIARY SYSTEMS IN AN EASTERN CITY, LATITUDE OF NEW YORK.

Gas rate, 90 cents per 1,000 cubic feet.

Four tank water heaters were placed in series with the hot water system, and the installation used in the early fall and the late spring for house heating, and as a booster during the extremely cold weather.

The statement shows the combined consumption of the supplementary heaters, gas range and lighting up to and including the month of April, and from that time on the bills showed only gas range and lighting consumption. The gas used was as follows:

January	5,800	July	5,300
February	4,700	August	5,200
March	5,200	September	4,300
April	5,000	October	7,800
May	6,300	November	9,200
June	5,700	December	4,400

The house contains 11 rooms, the cubical contents was 14,850 cubic feet, with 632 square feet of radiation.

Frame house, 10 rooms, one of which is a large living room; of average construction, at least 200 feet from any other house, situated on a high elevation; sun parlor, living-room and sleeping-rooms have northwesterly exposure.

House is heated by steam—radiation 500 square feet, with 600 feet gas steam boiler—coal boiler radiation is 1,100 feet.

Gas steam boiler used for auxiliary heat only, when coal boiler is not in operation. Used principally in the spring and fall, and in winter when the weather is mild.

Has been used exclusively to date this fall—Nov. 8, 1915.

There is a room temperature regulator.

1913-1914.	
October-November	4,400
November-February	11,100
February-May	900
May-June	500
1914-1915.	
September-October	5,300
October-November	30,700
November-December	1,600
December-April	4,200
April-May	8,500
May-June	5,200
June-September	600
September-October	10,000

ALL-GAS HEATING IN AN EASTERN CITY, LATITUDE OF TORONTO, CANADA.

Month.	1913-1914.	1914-1915.
September	....	....
October	....	800
November	5,800	10,400
December	11,200	19,800
January	19,600	31,000
February	26,800	28,600
March	30,400	24,000
April	18,600	18,800
May	6,800	3,400
June	1,000	2,800
July	....	....
August	....	....

Time—November 12, 1913-June 12, 1915.
Cubical contents of house, 24,000 cubic feet.
Total consumption, 259,800 cubic feet.
Cost @ 70 cents M., $181.86.
Cubic foot cost, $0.0075. $25,000 residence.

Month.	1913-1914	1914-1915
September	....	....
October	....	7,200
November	....	19,200
December	....	32,800
January	33,600	52,200
February	52,200	47,200
March	49,200	37,800
April	22,600	38,200
May	15,400	12,400
June	8,000	17,000
July	1,200	600
August	....	....

Time—January 2, 1914-July 2, 1915.
Cubical contents of house, 18,143 cubic feet.
Total consumption, 446,800 cubic feet.
Cost @ 70 cents M., $312.76.
Cubic foot cost, $0.0172. $20,000 residence.

Month.	1913-1914.	1914-1915.
September	....	35,800
October	....	....
November	....	90,000
December	....	124,400
January	....	166,400
February	....	157,800
March	....	107,800
April	384,600	79,000
May	122,200	....
June	....	....
July	....	....
August	....	....

Time—February 18, 1914-April 24, 1915.
Cubical contents of house, 79,695 cubic feet,
Total consumption, 1,268,000 cubic feet.
Cost @ 70 cents M., $887.60.
Cubic foot cost, $0.0111. $100,000 residence.

Month.	1913-1914.	1914-1915.
September	....	....
October	....	400
November	....	3,800
December	....	8,800
January	....	13,200
February	....	11,400
March	....	10,000
April	7,200	10,000
May	10,000	3,000
June	1,000	1,800
July	....	....
August	....	....

Time—April 9, 1914-June 10, 1915.
Cubical contents of house, 8,821 cubic feet.
Total consumption, 80,600 cubic feet.
Cost @ 70 cents M., $56.42.
Cubic foot cost, $0.0063.
Six-suite apartment. Figures represent one suite only.

Months.	1913-1914.	1914-1915.
September	....	400
October	6,200	10,800
November	17,000	49,400
December	49,200	59,400
January	78,600	69,200
February	81,800	65,400
March	67,800	59,800
April	42,400	27,600
May	11,400	9,500
June	....	1,400
July	....	....
August	....	....

Time—October 20, 1913—June 20, 1915. Cubical contents of house, 37,285 cubic feet. Total consumption, 707,000 cubic feet. Cost @ 70 cents M., $494.90. Cubic foot cost, $0.0132. Six-suite apartment.

Peat Gas.

A report of trials made at the Hague Gas Works, as to the value of peat as a gas-making material, is reported in "Het Gas" by Hans Brandis, the engineer of the works.

Two kinds of peat were tried—large lumps (A), and small pieces (B). The laboratory analysis showed the following:

	A.	B.
Moisture	25.00 per cent,	18.00 per cent.
Volatile matter	48.00 "	50.00 "
Sulphur	0.27 "	0.49 "
Ash	2.70 "	5.00 "

A 10-foot horizontal retort was used for distillation, isolated from the other eight retorts in the bench, so that the gas could be separately taken off, purified and tested. The working temperature was the same as in regular use for the distillation of coal.

It was found impossible to fully charge the retort with the peat, as the production of gas in the first period of carbonization was so large that the experimental plant was not adequate in size for dealing with it. This necessitated working with charges not exceeding a hundred kilos—a circumstance that must be remembered in considering results, as the volume of air in the retort obviously had some influence on the quantity of nitrogen in the gas. The tests with mixed peat and coal were made with normal charges of 160 kilogrammes.

The coke produced was weighed after quenching; and though the minimum of water was used, the coke was found to be more porous than that of gas coal, and so took up more water.

No attention was paid to the production of tar and ammonia, because the principal question to be determined was whether peat could be used in emergencies for the production of town gas.

TEST I.—*Carbonization of Peat "A."*

The gas production per metric ton was 17,885 cubic feet; coke, 33% (wet); gross calorific power of the gas, 385 B. T. U.; specific gravity, .670; sulphur in the purified gas, 9.7 grains per 100 cu. ft.

Composition of Gas.

Corbon dioxide	15.6 per cent.
$C_n H_m$	2.7 "
Oxygen	0.8 "
Carbon monoxide	21.0 "
Methane	13.7 "
Hydrogen	37.0 "
Nitrogen	9.2 "

The coke was very bad, consisting of small lumps, resembling charcoal.

TEST II.—*Carbonization of Peat "B."*

The gas production per metric ton was 17,255 cubic feet; coke, 40.2% (wet); gross calorific power of the gas, 366 B. T. U.; specific gravity, .650; sulphur in the purified gas, 15 grains per 100 cubic feet.

Composition of Gas.

CO_2	13.0 per cent.
$C_n H_m$	2.1 "
O_2	0.7 "
CO	23.8 "
CH_4	12.1 "
H_2	39.6 "
N_2	8.7 "

The coke was of somewhat better quality than that from "A," but very brittle and unfit for transport.

TEST III.—*Carbonization of English Gas Coal.*

The gas production per metric ton was 10,097 cubic feet; coke, 76% (wet); gross calorific power of the gas, 558 B. T. U.; specific gravity, .401.

Composition of Gas.

CO_2	1.9 per cent.
$C_n H_m$	3.4 "
O_2	0.8 "
CO	7.1 "
CH_4	29.0 "
H_2	53.3 "
N_2	4.5 "

The quality of the coke was good—large lumps, with only a small proportion of breeze.

TEST IV.—*Carbonization of 80 per cent. of Gas Coal with 20 per cent. of Peat "A."*

The production of gas per metric ton was 12,635 cubic feet; coke, 69.2% (wet); gross calorific power of the gas, 472 B. T. U.; specific gravity, .476.

Composition of Gas.

CO_2	6.0 per cent.
$C_n H_m$	2.4 "
O_2	0.9 "
CO	10.9 "
CH_4	19.6 "
H_2	51.4 "
N_2	8.8 "

The coke was fairly good. The peat coke is distinctly visible, as small lumps resembling charcoal.

TEST V.—*Carbonization of 80 per cent. of Gas Coal and 20 per cent. of Peat "B."*

The production of gas per metric ton was 12,728 cubic feet; production of coke, 69.7% (wet); gross calorific power of the gas, 495 B. T. U.: specific gravity of the gas, .541.

Composition of Gas.

CO_2	6.6 per cent.
$C_n H_m$	3.0 "
O_2	0.9 "
CO	13.2 "
CH_4	22.3 "
H_2	47.2 "
N_2	6.6 "

The coke was of fairly good quality, the peat coke was clearly distinguishable, but the lumps were larger and less brittle.

TEST VI.—*Carbonization of 90 per cent. Gas Coal and 10 per cent. Heavy Peat "A."*

The production of gas per metric ton was 11,672 cubic feet; coke (wet) 72%; gross calorific power of gas, 543 B.T.U.; specific gravity, .448.

Composition of Gas.

CO_2	4.2 per cent.
$C_n H_m$	2.9 "
O_2	0.9 "
CO	10.0 "
CH_4	25.1 "
H_2	53.0 "
N_2	3.9 "

TEST VII.—*Carbonization of 90 per cent. Gas Coal and 10 per cent. Peat "B."*

Production of gas per metric ton was 10,976 cubic feet; coke (wet) 72.4%; gross calorific power of gas, 544 B.T.U.; specific gravity, .469.

Composition of Gas.

CO_2	4.6 per cent.
$C_n H_m$	3.0 "
O_2	0.7 "
CO	10.5 "
CH_4	24.9 "
H_2	51.9 "
N_2	4.4 "

In both cases, the coke was good, and no separate peat coke was to be seen.

PUBLIC RELATIONS.

Paper by E. N. WRIGHTINGTON, to the International Gas Congress.

Why is it that it is so hard to convince the public that managers of gas companies are sincere when they make such statements as the following?

"It is our aim to give the very best service."
"A satisfied customer is our best asset."
"We realize that the good will of the public is essential to the success of our business," etc.

I think it is because the public has an idea that the gas business is different from the ordinary mercantile business; and the reason they hold this belief is because gas managers themselves, not so very long ago, taking them as a whole, had the same attitude. Time was when applicants for gas service were required to come into the office, and if they looked perfectly respectable and put up a sufficient deposit, they were permitted to sign their names in a big book and allowed the privilege of using gas. No wonder they absorbed the feeling that a gas company was a monopoly, and that all persons who expected to be its customers must conform strictly to its rules and regulations. This treatment was so different from that the customer received from other merchants with whom he was accustomed to do business that it was quite natural for him to attribute it to the fact that competition forced merchants to adopt methods that apparently were not necessary in the case of the gas company, because it had a monopoly. If the gas manager of the past did not realize the real competitive nature of his business sufficiently to solicit and encourage business, how could his customers be expected to?

But, however long it may have taken gas managers and gas customers alike to recognize the fact, the gas business is no different from any other business, with respect to the principles governing the marketing of the product. The supply of gas in a given city may be, and should be, furnished by a single company; but to this extent only is the business a monopoly, because results similar to those secured by the use of gas may be obtained in many other ways, by means of other products. Coal, oil and electricity are active competitors of gas. Even if gas were the only medium by which a given result could be secured, it is still just as important for the interest of the gas company that good service be given; because the free and willing use of gas on the part of a satisfied customer will greatly exceed that of a disgruntled and unwilling customer who uses just as little as he possibly can. It must, therefore, be perfectly clear to gas managers that only by active and aggressive methods of solicitation of business, combined with a sincere effort to perfect the service and give the customer the most for his money, can the fullest returns from the business be secured.

Once the gas manager has convinced himself of the advantages of such business methods, it becomes necessary to transform the traditional feelings of the customer also. The way to do this is to make every customer feel that his patronage, however small, is of the utmost concern to the company; and as a matter of fact this is absolutely the case. The gas business for the most part is made up of a large number of comparatively small accounts. The average in most companies does not exceed $3.00 a month. While each of these accounts is small in itself, in the aggregate they make the volume of the business. Each amount bears its part in the total, and every customer should be made to feel that his account is appreciated, no matter how small it may be.

If complaint is made regarding any part of the service, the greatest defference should be shown to the point of view of the customer, and the utmost endeavor made to satisfy him. Unfortunately the majority of complaints made are regarding the size of the customer's bills, and many customers will be satisfied with nothing less than a reduction in their amount. In most instances the bills have been rendered correctly, so that a reduction or rebate is impossible. In these cases the greatest tact is needed to prevent the customer from getting the impression that the company has assumed an arbitrary or unreasonable attitude in refusing to make the rebate, as most customers are honest in their views regarding the apparent discrepency between the amount of gas which they think has been consumed ,and that which has been billed to them. It becomes necessary to explain to such customers that they must not expect the company to tell them why one gas bill is larger than another, when they can't tell themselves. The gas company is not responsible for the amount of the bills, but merely records information that is equally available to the customer himself, and calculates from such records the amount due. The gas company has no more to do with the size of a customer's bills than the next door neighbor, except that the company furnishes the measuring device and informs the customer of the amount it registers. The measuring device, the gas meter, is installed on the enstomer's premises day and night, and is naturally a more dependable witness as to the amount of consumption than any estimate or calculation made by the customer, who cannot possibly be aware of all the conditions on his premises throughout the whole 24 hours. These facts have become so familiar to the gas man that it is sometimes all the more difficult to make them clear to the customer in a tactful and convincing manner. Many times it will be possible to account for the increased size of the bill by a waste of gas through burners and appliances, or by some unusual condition not known to the customer at the time. A careful investigation by a competent inspector is advisable in all instances, and if nothing is found to account for the discrepancy, especially where conditions have returned to normal, it only remains to explain to the customer that the amount has been verified and found correct; that the record of the meter has been proved and its accuracy determined by test, and consequently that the bill represents gas actually furnished by the company.

It is a good plan to explain to the customer the method of operation of the gas meter, and thus demonstrate that no gas can be registered on the dial unless it passes through the meter, and no gas can pass through the meter without passing out through some outlet beyond it.

One of the most important things in the handling of complaints is promptness in acknowledging the complaint and in conducting the necessary investigation. Letters should be acknowledged the same day received, and personal interviews should be met, as far as possible. I have emphasized the necessity of careful handling of complaints because a proper conduct of such a department is one of the most important elements in creating good will in our public relations, which is so desirable.

With the realization on the part of the gas company managers of the importance of developing "the satisfied customer," comes the problem of the maintenace of customers' appliances. Gas is only a means to an end. It is not in itself light, heat or power, but only produces these results through some other medium—namely, what we call the appliance. We are not responsibe for what appliance the customer selects, nor for its condition during usage; but if he selects a poor appliance, or if he allows its condition to deteriorate through abuse or ignorance, we suffer a financial loss, because if competition does not cause him to discard the appliance, dissatisfaction will at least cause him to use it as little as possible.

The public do not seem to realize that it would be much more to their advantage to keep the price of gas at figures that will permit free maintenance of certain appliances, than to reduce it to a figure that precludes such maintenance. Gas at $1, including maintenance, is cheaper than gas at 80 cents, if at the latter price appliances are at 50 to 75% of their maximum efficiency. Gas engineers use their utmost skill and energy to reduce the cost of gas in order to satisfy the demands for reduced prices, and much of this effort is wasted if the gas is transformed into light, heat and power through an inefficient appliance. Such unsatisfactory conditions will continue so long as the public insists on mere reductions in the rate per 1,000 feet, instead of improvements in the conditions under which the gas is actually used. Such short-sighted policy should be explained to the public and especially to that portion of the public that has to do with rates.

It is encouraging to the owners of gas properties to note a somewhat saner attitude on the part of our rate-making bodies toward the companies. So many of our commissions and other bodies have agreed that a public utility should be permitted a reasonable return considerably removed from the point where confiscation begins, and have gone on record to this effect, that a very substantial precedent has been established which will undoubtedly have a marked effect on future decisions. This conclusion has been arrived at, not from a sense of fairness to the companies alone, but also because it is admitted that the public is better served by a prosperous than by a failing utility.

(Continued on page 90.)

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CHARLES H. WADELTON,
Secretary and Manager.

NEW YORK, MONDAY, FEBRUARY 7, 1916.

Will Not Assume Managerial Responsibility.

Unlike the Commissions in some States, one of which ordered the discharge of a manager, the Second District, New York Public Service Commission, has no wish to actually run the utilities under its jurisdiction.

In a recent order, though relinquishing none of its regulatory powers, it decided that it cannot assume the functions of the managers of a corporation, and pass on the business wisdom or unwisdom of the acts of a board of directors, made in goodfaith and within the provisions of the law. The Commission denies the application of a bond holder to have revoked a previous authorization of the Commission for an issue of $134,000 of bonds, with the proceeds of which the Suffolk Gas and Electric Light Company was to make extensions to its gas lines from Babylon to Bay Shore and Sayville; who objected that the issue of these bonds jeopardized his equity in bonds of a previous $350,000 issue, in that the later issue saddled the company with an unprof.table extension, for which it paid an excessive price through large profits to an associated construction company.

After an examination of the affairs of the gas company and the construction company, the Commission finds that the material allegations in the complaint were unfounded. The opinion of the Commission, writted by Chairman Van Santvoord, enunciates the doctrine that regulatory bodies should not assume actual management of the corporative activities under their control, and makes clear that in the present instance the examination of the affairs of the companies concerned, shows that nothing was done in contravention to the Public Service Commission Law, and that the indidations are that the steps taken by the company were for its best interests, and the best interest of all concerned.

"Although this Commission," he says, "has repeatedly and consistently discouraged the creation of construction companies to undertake the work of extensions and additions of public service corporations which, either directly or indirectly, own or control such construction companies, and has invariably refused to sanction capitalization by operating companies of so-called profits to such a construction company, where the transaction appeared in the slightest degeee questionable, we fine nothing improper or objectionable in the relations thus far disclosed between the corporations under consideration in this case, or in the so-called 'contractors' profit' of 10 per cent. on direct labor and materials, paid to the construction company to cover its legitimate and necessary outlay."

Empire State G. & E. Executive Meeting.

The regular monthly meeting of the Executive Committee of the Empire State Gas & Electric Association, was held January 19th. There were present Messrs. J. C. DeLong, E. H. Palmer, Stuart Wilder, A. B. Tenney, J. T. Hutchings, H. M. Beugler, C. A. Graves, C. G. M. Thomas and Wm. R. Huntley.

The Middleport Gas & Electric Company and the Cayadutta Generating Company were elected active members of the Association.

The Secretary was instructed to write to the American Gas Institute and the National Commercial Gas Association calling attention to correspondence with the Bureau of Mines in reference to the use of coke for house heating and suggesting that as this is a national question it should properly be followed up by the national associations.

Two additional committees were appointed with duties similar to those of the committees that hold open meetings from month to month in different parts of the state. These new committees are —Natural Gas Committee: W. M. Gurnsey, Crystal City Gas Co., Chairman; Harry Bradley, Canisteo Gas Co. and H. E. Gough, Elmira Water Light & R. R. Co. Commercial Committee: A. D. Dudley, Syracuse Lighting Co., Chairman, L. H. Scherck, Central Hudson Gas & Electric Co. and C. A. Barton, New York & Queens Electric Light & Power Co.

The Secretary read a report of a meeting of a committee on cooperation, composed of the Secretaries of the National Electric Light Association, American Gas Institute, National Commercial Gas Association and Empire State Gas & Electric Association. The report suggested consolidation of the Public Policy or Public Relations Committee of the three national societies into one Public Relations Committee, to which questions would be referred by the Executive Committees of the organizations, it being shown that the same persons were in many cases on two or even on all of the present committees. Similar consolidation, of other committees, such as the Accounting Committee and the Accident Prevention Committees, were suggested and approved.

Invitations from the Public Policy Committee of the National Electric Light Association to the President and Secretary to a conference on February 16th and 17th were read, and it was voted that they attend, as representatives of the Association.

Consideration was given to a communication to the President from the Division of Light, Heat & Power, Public Service Commission, Second District, asking whether the Association could take up the question of simpler and more uniform forms of applications or contracts to be signed by persons desiring service. The matter was referred to the Commercial Committee for investigation and report.

The Committee on overhead and underground crossings reported briefly on its work to date. It is probable that in the near future a conference will be called by the Public Service Committee, 2nd District, of the various utilities interested in this matter, and the committee is preparing itself to represent the gas and electric companies at this conference and in later discussions of the subject.

The following resolution relating to the death of the Association's first president, was unanimously passed:

Whereas, the Empire State Gas & Electric Association has learned with deep regret of the sudden death of its first president, Mr. William Weadon Cole, on December 20th, 1915, it is hereby

Resolved, that the Association place on record its deep feeling of loss and sense of regret at the death of its first pressdent, who for a number of years has been prominent in the central station industry and active in the affairs of this Association, and

Resolved, that the Executive Committee of the Empire State Association, in its behalf, hereby further records its appreciation of the pioneer work which he did at the time of his presidency. It is also

Resolved, that these expressions of esteem and regret be entered in full on the minutes of the Executive Committee, printed in the official bulletin of the Association and sent in due form to the members of Mr. Cole's family.

The Committee on making gas and electric securities available as savings bank investments reported progress; and after other informal discussion the meeting adjourned.

[OFFICIAL NOTICE.]

Illuminating Engineering Society.

OFFICE OF THE CONVENTION COMMITTEE,
Irving Place and Fifteenth Street,
New York City, January 15, 1916.

The Mid-Winter Convention of the Society will be held in New York City, at the Engineering Societies Building, Thurday and Friday, February 10th and 11th, 1916. At this time the Society celebrates the decennial of its existence.

The list of the papers to be presented shows a wide range of subjects. There will be a review and record of what has been accomplished in the art and science of illuminating engineering, and it is hoped that the discussion will bring out plans for the future advance of the art. From this discussion the Society expects a year of greater activity than ever before, in all the fields covered.

PAPERS PROGRAM.

"Relation of Lighting to Architectural Interiors," Prof. Morgan Brooks.

"Candle Power Measurements of Series Gas Filled Incandescent Lamps," Ralph C. Robinson.

"Theatre Lighting," Bassett Jones.

"Illuminated Engineering Photographs," B. H. Norris.

"Lighting of the General Offices of the Consolidated Gas and the New York Edison Companies, Consolidated Gas Building, New York City," Thomas Scofield and Clarence L. Law.

"Gas Lighting of a Large Cathedral in Philadelphia," J. D. Lee.

"An Interlaboratory Photometric Comparison of Glass Screens and of Tungsten Lamps, Involving Color Differences," G. W. Middlekauff and J. F. Skogland.

"An 'Average Eye' for Heterochromatic Photometry, and a Comparison of a Flicker and an Equality-of-Brightness Photometer," E. C. Crittenden and F. K. Richtmyer.

"An Intergrating Sphere," E. B. Rosa and A. H. Taylor.

"The Box Photometer," Prof L. O. Grondahl.

Lecture—Illustrated lecture on the lighting of the Panama-Pacific Industrial Exposition, W. D'Arcy Ryan.

The feature of the Convention will be the acceptance of honorary membership in the Society by Mr. Thomas Alva Edison, who will receive this honor at a banquet to be tendered him at the Biltmore Hotel, on Thursday evening, February 10th, at 7:30. It is hoped that all delegates and their friends will be present at this time. An entertainment program is being arranged to immediately follow the banquet. Subscription to the banquet will be $5, and visiting out-of-town ladies to the Convention will be guests.

The Committee wishes to especially invite ladies to this Convention, and arrangements are being made for their entertainment. Among other features, a luncheon will be given at the Biltmore Hotel to the ladies on Thursday noon, when a special exhibition of ice skating will also be made, so that guests at the luncheon can take advantage of the skating.

On Friday afternoon a popular lecture will be given by W. D'Arcy Ryan, the designer of the lighting of the Panama Pacific Exposition, illustrated by colored transparencies, 24 x 36 feet, which will convey more fully to those who have not visited the exposition the wonderful lighting effects produced.

No provision has been made for a hotel or transportation committee, because the many hotels in New York afford a range in price and convenience that should suit all delegates. Any information with reference to transportation the Secretary of the Committee will be very glad to furnish upon request.

On Tuesday and Wednesday, February 8th and 9th, the American Institute of Electrical Engineers hold their Mid-Winter Convention at the Engineering Societies Building, and all members of our Society are invited to participate in their activities.

This season of the year is a very popular one in New York city, and it is the hope of the Committee that all members will take advantage of the two Conventions and spend a profitable and entertaining week in the city.

ARTHUR WILLIAMS,
Chairman Convention Committee.

[OFFICIAL NOTICE.]

Empire State Gas and Electric Meeting in Yonkers.

The meeting of the Empire State Gas and Electric Association, under the direction of the Gas Distribution Committee, will be held in Elk's Hall, Yonkers, on Friday, February 11th. The meeting will be in charge of R. M. Kellogg, Chairman of the Committee, and will convene at 10 A.M.

The topics to be discussed have been selected from a long list of suggestions sent to the Committee by Superintendents of Distribution and others connected with the distribution departments of the gas company members. They are as follows:

Pressures.—Control and equalization in street mains.

Drips and Drip Pumping.—System of checking up on adequate pumping. Disposition of drip oil in yard and street.

Electrolysis.—As affecting mains and services. Mitigation and prevention.

Unaccounted for Gas.—In high and low pressure systems. Influence of condensation.

Inspection of Appliances.—Just after installation. Subsequent inspection.

Street Leaks and Main Inspection —Locating leaks in Winter—in Summer. Testing mains. Patrolling.

Consumers' Meters.—Meter connections. Testing results, as an index to general condition of meters. Cast iron meters.

Some time during the day the motion picture film, "First Aid to Persons Overcome by Gas," will be shown in a theatre in the neighborhood.

[OFFICIAL NOTICE.]

New England Association of Gas Engineers.

The 46th Annual Meeting of the New England Association of Gas Engineers will be held at Young's Hotel, Boston, Wednesday and Thursday, Februaty 16th and 17th, 1915.

The following papers are being prepared:

"Gas Meters," by Chas. D. Jenkins, Boston.

"High Pressure Systems and Welding of High Pressure Mains at Springfield, Mass.," by A. S. Hall, Springfield.

"Intensified Selling, as Applied to Gas Water Heaters," by A. A. Higgins, Providence, R. I.

"Aligning and Releveling 200,000 cubic foot Holder at New London," by V. E. Bird, New London, Conn.

"Burning and Distilling Water Gas Tar," by Chas. Otten, Jr., Haverhill, Mass.

"Residence Burner Maintenance," by W. A. Parkhurst, Lowell, Mass.

The Question Box includes the following:

"What Carbonization Results are being Obtained in New England?"

"Is it Profitable for a Gas Company to have a Separate Store for the Sale and Exhibition of Appliances?"

"Is Income per Meter Greater from Prepay or Regular Meters among Poorer Consumers?"

"How can Income from Coal Tar Products be Increased?"

Valuable answers to this last question will be given.

Application for membership should be sent to the Secretary before February 15th.

The Annual Dinner will be at Young's Hotel, on the evening of Wednesday, at 6:30 o'clock.

On Thursday, February 17th, at 3 P.M., at the City Club, Mr. W. D. A. Ryan will give his magnificent illustrated lecture on "Illumination at the Panama Pacific Exposition." This will be a rare treat.

Please plan to be prompt in attending the sessions.

N. W. GIFFORD, Secretary.

(Continued from page 87.)

Public Relations.

An example of this disposition, to treat the companies more justly is shown by the attitude of the Massachusetts Legislature of last year in refusing to repeal the so-called Sliding Scale Act, under which the Boston Consolidated Gas Company has been operating for the past 9 years. This Act was patterned after similar methods of regulation that had long been in successful use in England. It provides that for every 5-cent reduction in the price of gas below 90 cents, the company could pay an additional dividend of 1% over and above the standard rate allowed on 90-cent gas, which is 7%. Under this Act the price had been reduced from 90 cents in 1906, to 80 cents, and dividends had been increased to 9% except during 1914 when 8% only was paid, and in 1915, 8½%. Although the company had been unable to pay the 9% dividend to which it is entitled under the 80-cent rate, a bill was introduced to repeal the Sliding Scale system and make the price of gas 70 cents. The bill, however, was opposed by many prominent citizens, and by the newspapers without exception. It was opposed on two grounds; first, because it violated the principle of partnership upon which the "Sliding Scale" is based; and, second, because it would have been a distinct breach of faith for the legislature to repeal an Act accepted in good faith by the company, especially when the company had done more than its share in making reductions in price under the Act.

This sentiment of the community was finally reflected in the adverse action of the legislature in dealing with the proposed bill for 70-cent gas. The experience is perhaps, as I have said, an encouraging sign of an improved attitude of public bodies toward our public service companies, and yet, at the same time, it cannot help but have a dampening effect upon the ardor of a would-be investor in such properties to feel that he has to take the risk of such unjust attacks with only the United States Supreme Court to stand by him in his investment, and even then on the basis perhaps of ordinary interest rates, only. Small wonder that he would choose some other safer and more attractive form of investment, in which event the public as well as the company would be the losers.

It seems to be recognized by the public, as an abstract proposition, that these companies should be reasonably prosperous; but the demand for lower prices in concrete cases goes on just the same. The owners of the Boston companies, who go under the name of Massachusetts Gas Companies, had an experience of this sort in a small city not far from Boston. The leading men of the city and the officials of the local government were very desirous of having our company take over the gas business there. This was finally assented to by our people, and ever since, in spite of frequent reductions, there has been constant agitation for still lower prices, which have finally culminated in a demand for gas at the same price as in Boston, because the company is owned by the same persons.

All this is perhaps a natural outgrowth, caused by generous earnings in past years having created such a feeling of hostility in the minds of the public that it takes years of fair dealing before confidence is restored. Consequently, it seems to me, we should feel very much encouraged to note that, in the era of regulation which has swept over the country, such a conservative stand has been taken by most of those having the authority to regulate our doings. Most of the agitation that we meet, and which appears so unfair to us, is caused either by ignorance on the part of the general public, or by play for public favor on the part of politicians who are for nothing but votes.

This ignorance of the general public is caused by our own failure to keep them informed regarding the questions that affect our mutual interests. It is exemplified in their attitude toward such questions as competition, municipal ownership, tax for use of streets and short term franchises. We should not neglect any opportunity to remove the fallacy in the popular thought on these questions.

For instance, it is quite natural for one unfamiliar with the conditions, to put the same reliance upon the efficacy of competition in regulating prices in the gas business as in any other mercantile business. And the fact that the gas company is a "monopoly," is, to the superficial observer, sufficient to show as a corrollary that the prices must be high. It is our business to inform such a one that it takes perhaps 6 years to "turn over" an investment in the gas business, while in most mercantile lines the investment is turned over at least four times a year; and that consequently the duplication of the investment in one case is a much more serious matter than in the other. In other words, the gross yearly income of the gas company is about one-sixth of its investment, while that of the merchant is four times his investment; and ordinary interest on the investment at 6% amounts to 36% of the income of the gas company, and only 1½% of the income of the merchant.

If these facts are pointed out to the public, it is a simple matter to show that two gas plants and two sets of gas pipes in the streets in the same city, result in an economic loss to the community. Experience also has shown that no permanent relief is given to a community by admitting a competing company. For the reasons already stated, the investments are necessarily so high, compared with the gross returns, that, sooner or later, one company or the other must get control to save them both from ruin; and the public usually "pays the bill" in the end. It is for these reasons that regulation by commission has been adopted in preference to regulation by competition. The point that I am making is that the public should be taken more into our confidence, and these things explained to them.

The same thing is true with some of the old theories about municipal ownership. Its fallacies may be easily pointed out, but unless they are refuted the public is apt to draw eroneous conclusions. Capital has to earn interest, whether risked in private or public enterprise. The so-called "profits" of the gas company are only the return to which money is entitled for its use. The charge for the use of money to a municipality may be more than the actual borrowing rate, because of the risk that may be involved in the enterprise itself, as distinct from whether it is owned by private or public owners. Any slight difference in the rate of return to private, as compared with public, capital is more than offset by the necessarily greater inefficiency of the latter. Other expenses of the municipally conducted utility can be no less than the private. Taxes lost, depreciation, and other such items cannot be escaped. No private business would be run successfully by a management frequently changed in personnel, as is the case with all municipal government. Municipal managements have great difficulty in enforcing discipline, or in meeting the demands of employees that may be entirely unreasonable, but which they, for political reasons, do not dare to refuse. Consequently, it is not surprising that almost all the publicly owned plants in this country have been failures.

If a municipality should decide to "try its luck" at public ownership, it should be done only by purchase of the existing private plant. Competition between private and public owners, where losses of the latter may be taken from the tax-payers and where the private company is dependent upon the municipality for its rights to street locations and the like, is only confiscation under another name. Such a system is not only manifestly unfair to the capital invested in the private business, but in the end will discourage all private investments, which would react adversely upon the consuming public.

The Massachusetts law governing the relations of private and municipal owners is a good one, both for the public and the companies. In the first place it requires that a municipality cannot adopt public ownership on the "spur of the moment;" but must give the subject due deliberation by requiring the passage of the vote by two successive years' governments and afterwards by referendum to the people. The law further requires the purchase of the existing plant at its fair value without enhancement on account of earning power, good will or franchise values, and with due allowance for depreciation. The price, if not agreed upon, is determined by the court. This plan permits the purchase of a ready-made plant at probably less than the cost to duplicate it, and at the same time prevents unfair competition with resulting duplication of plant, if the two systems were allowed to exist together.

The folly of the short term franchise is apparent on analysis. A community is afraid to trust a public utility to deal justly with them indefinitely. Consequently, it says we will let you have rights to do business here for 20 or 30 years. This seems quite a long time, and perhaps the present owners not caring very much about the future, accept the terms. What is the result? Long before the end of the franchise term some part of the plant has to be renewed. Naturally the replacement is made with the idea in view that the plant may be scrapped in a few years. As the time draws near for expiration of the franchise, the plant is more and more "starved" and the service suffers. Nobody gains by the transaction. The owners are taking continual risks of losing their whole investment; the consumers pay more because the owners seek to regain the entire investment before the term expires; and the service received by the community is necessarily of the worst.

Why is the "use of the streets" by a gas company considered

any more of a "privilege" than their use by anyone else? Individuals, corporations, municipalities, all enjoy the right to use the streets. That is what the streets are for, and people are permitted to use them for the general good of the community. That gas companies and electric companies should be pointed out as recipients of special favors because they share the use of the streets with other classes in the community, seems illogical, especially when it is remembered that these companies deal in commodities that the community would find it almost impossible to do without. As a matter of fact, gas companies, in their use of the streets, create as little disturbance as almost any class of users. Once the pipes are laid they are not often disturbed. They cause no congestion, no wear and tear on street surfaces, in fact no expense upon the city. Can the same thing be said of the teams that deliver hard fuel? And yet who ever heard of the coal companies paying a special tax for the use of the streets? Gas service is so nearly universal that the tax if paid, merely goes from one pocket of the community to the other, and municipal extravagance is likely to lead to a loss in the handling.

The only way to gain the confidence of the public is, first of all, to merit it by square dealing, and then to take them into our confidence: "Give full publicity to all our dealings; tell the public how much we earn; and how it represents only a fair return on our properties; and wherever there is a dispute over any matter, be as tactful in handling it as possible. This is the way to get that desirable asset, the satisfied customer."

Naphthalene Motor Fuel.

[Abstract of article by HERR K. BRUHN, in "Journal für Gasbeleuchtung."]

Searching for a cheaper fuel for internal combustion engines, attention has been drawn to naphthalene. It is cheap, and has particular technical advantages. The naphthalene produced is about 0.3% of the coal carbonized, which corresponds to a recovery from the tar distilleries and benzol works of Germany of nearly 600,000 metric tons per annum.

The naphthalene is recovered from the tar oil distillates in varying degrees of purity. Naphthalene contains less hydrogen than benzene, and being a product of high temperatures, is stable, and has a high temperature of ignition, which is an advantage for motor purposes, since it admits of higher compression being used. Pure naphthalene is white, melts at 79.6° C. (175° F.), and boils under 760 mm. pressure at 218° C. (424° F.). The interval between melting and boiling points favors the use of naphthalene in the liquid state. In molton condition it is a clear colorless liquid. On passing from the solid to the liquid state, its volume increases considerably — a property which has to be taken into account in handling it.

The specific gravity of the liquid at 80° C. is 0.977; that of the solid at 15° C. is 1.15. Crude naphthalene has a lower melting point and higher specific gravity than the pure. Its fusion is easy as the latent heat of fusion is only 36 calories. The high vapor pressure of naphthalene is noteworthy, and is responsible for the difficulty of removing it from coal gas; but in a motor it facilitates the formation of practicable mixtures of the fuel and air. The flash point in the Pensky-Martens apparatus is 80° C.; the temperature of ignition in an open crucible is 98° C.

Theoretically, 1 pound of naphthalene needs 162 cubic feet of dry air for complete combustion. The complete combustion of naphthalene vapor is attended by an increase in volume; 13 volumes of a mixture of naphthalene and oxygen yielding 14 volumes of carbonic acid and water vapor. The gross calorific power of naphthalene is 9,600 calories per kilogramme (17,280 B. T. U.); per pound); but the net calorific power is but 9,300 calories (16,740 B. T. U. per pound. Attempts have been made to use a solution of naphthalene for motor fuel, and, therefore, its solubility in various fluids is important. It is insoluble in water, but is dissolved by the following solvents in these percentages by weight: Alcohol, at 10° C., 5.00%. petroleum ether, 11.05%; benzene, 40.70%; toluene, 35.30%; xylene, 29.00%.

The addition of naphthalene to benzene lowers the freezing point of the latter—an important point in motor benzol for use in cold weather. Benzol, which crystallizes at 41° F., on the addition of 30% of naphthalene deposits no solid matter at 26° F. Naphthalene has the peculiarity that, on cooling below the melting point, it does not pass through the liquid state, but immediately forms solid flakes.

THE NAPHTHALENE ENGINE.

Naphthalene has the advantage of yielding a vapor of uniform composition, but it has to pass from the solid through the liquid state before vaporization. Hence a naphthalene engine must have a vessel for melting the naphthalene, kept hot enough to prevent solidification. The first practicable engine was produced by the Deutz Gas Engine Works in 1907, and a few years later Messrs. Benz & Co. started making them. In 1914 there were about 1,000 such engines at work. In 1911, the output of naphthalene engines was 68, with an aggregate of 678-horse power; in 1912, the output had increased to 283 engines, with 2,961-horse power; while in 1913 the output rose to 367 engines, aggregating 3,934-horse power.

The naphthalene engine is generally a single or two cylinder four-cycle horizontal engine similar to the Otto engine. On the cylinder, with the cooling jacket is a double-walled naphthalene fusing tank, from which a heated tube leads to the carburettor through a float-valve. In the earlier engines, the naphthalene was melted by the exhaust gases—but this had the disadvantage of over-heating and too free evolution of vapor. In the older Deutz engines the cooling water was led to a tank, in which the water came to a boil, the naphthalene receptacle suspended in it. The hot water surrounded all the parts in order to prevent the naphthalene from solidifying but it was found that the naphthalene solidified in the sprayer unless the air supply was warmed. The heat of the exhaust gases was therefore used to raise the temperature of the air to 120° to 150° C.

In later Deutz engines there is a small water-tube boiler (heated by the exhaust gases) which raises the temperature of the cooling-water to boiling point quickly after the engine is started, and the naphthalene is melted more quickly than in the old type.

These engines cannot start cold on naphthalene, and are designed to start with gas or liquid fuel. After running a while and becoming warm, the change-over is made to naphthalene; or an independent source of heat may be used to enable the engine to start direct on naphthalene. Naphthalene engines have only been made in sizes of 4 to 20-horse power per hour; but in consequence of the increase in the price of liquid fuels caused by the war, larger units are now being constructed.

Efficiency tests were made on a Deutz 6-horse power naphthalene engine at the Royal Engineering School at Essen, after the engine had been used for nearly a year. It was of an old type, with the naphthalene tank on the cylinder, the flow of liquid naphthalene controlled by a float, just as with gasoline engines. The flow of the mixture is controlled by a centrifugal governor. The diameter of the cylinder was 6.7", stroke 9.5", and it made 260 revolutions per minute. The total cylinder volume is 400 cubic inches, and the compression space 67 cubic inches.

Tho starting was with benzol, the consumption being from 9.81 to 9.88 oz. per horse power-hour; the load 5.6 to 8-horse power. The naphthalene consumption for loads from 4.1 to 6.7-horse power varied from 9.95 to 11.37 oz. per horse power-hour. The increased consumption of naphthalene as compared with benzol being proportional to the lower calorific value of naphthalene. The consumption of naphthalene at loads below the normal showed the same proportional increase as is usual with motor spirit.

Consumption at	Half Load		Three-Quarter Load		Full Load	
Fuel.	Consumption. oz.	Cost. cents.	Consumption. oz.	Cost. cents.	Consumption. oz.	Cost. cents.
Gasoline....	16.6	4.30	13.1	3.40	11.3	2.94
Benzol.....	14.1	2.90	10.6	2.20	9.5	1.95
Naphthalene	13.4	1.10	11.3	0.96	10.2	0.85

In the table the cost of motor spirit is taken at $95 per ton, benzol at $74.50, and naphthalene at $30.

The figures are extremely favorable for naphthalene. The capital cost of the benzol engine, including fuel tank and foundation was $550, and of the naphthalene motor, including tank, heating arrangements, and foundation, $635. The cost of operating, including interest, depreciation, attendance, lubrication, and fuel, works out at 2.50 to 4.25 cents for the benzol engine, and 1.70 to 2.80 cents for the naphthalene engine, per horse-power-hour.

The naphthalene engine shows to best advantage on long runs.

The economy of the engine, and the small fire risks in the storage of naphthalene have led to trials of these engines for automobiles. For some purposes it is best to liquefy the naphthalene by means of a solvent, and most of the attempts to use naphthalene have been made with its solution in benzol. A saturated solution,

when cooled, deposits solid naphthalene, and the same thing occurs on evaporation of the solvent. Hence the mixture must be well below the saturation point, and additions of comparatively small proportions of naphthalene to benzol has been used with complete success in automobile engines.

The author concludes that the use of naphthalene as a fuel for small engines can be extended with advantage, and that late attempts are likely to end in the ultimate adoption of naphthalene as a fuel for commercial motor vehicles.

Publications.

[All Publications, Catalogues, etc., mentioned below, are kept in our office for the convenience of our patrons.]

National Commercial Gas Association, Salesman's Handbook.—The N. C. G. A. Salesman's Handbook has been issued and is for sale at Association headquarters, 61 Broadway, New York. The Handbook should really be called a *service*, for its completion will require five years at least, and it will be a reference and data book, continuously kept up to the minute by the issuance of new pages and the revision of old ones.

The service consists of a desk file, cloth covered, substantial in construction and attractive in appearance, in which are filed pages of the book not in current use; a leather binder or cover in which are kept the pages to which the user most frequently refers, and the book proper, which at present consists of approximately six hundred pages, divided into sections treating respectively:

Gas Manufacture and Distribution.
Domestic Cooking Appliances.
Illumination.
Water Heating.
Miscellaneous Appliances.
Gas Engines and Power.
Industrial Appliances.
Heating.
General Tables, Units, and Technical Terms.
Buyers' Index.

From time to time, new pages and revisions of old ones will be mailed to owners of the handbook.

The price of the book has been fixed at $7.50 which pays, not only for the outfit delivered this year, but for all pages issued during the next five years.

Additional Covers and Desk files will be sold for $1.00 each.

The Household Gas-ette.—The Meriden (Conn.) Gas Light Company issues an 8-page pamphlet every second month, for their consumers, the principal feature of the last issue being "Twenty Reasons Why Gas Bills are High."

Some of the questions and answers we have seen before, but perhaps the persons in Meriden, who want to know, obtained copies of magazines published elsewhere, and asked the same questions; and perhaps it is only a coincidence.

Consolidated Gas Building, New York City.—Few words but nearly 50 handsome illustrations are included in the booklet, 9 inches by 12 inches, published by the Consolidated Gas Company, of New York, describing their handsome building at Irving Place and 15th street. The building is also the headquarters of the various electric companies that are part of the consolidated system, and the best merchandizing spaces in the building are given over to the New York Edison Company, which does *not* sell appliances.

A striking feature of the building is the lighting fixtures. These are semi-indirect, and many of the electric fixtures harmonize with those made for gas.

The telephone switchboard is the largest used by a private company in New York.

Gas is used in the building for lighting, cooking, water heating, power and water sterilizing. No mention is made of gas being used for heating.

Citigas-Doings.—The Detroit City Gas Company issues a weekly employees bulletin, that for Jan. 28 starting off with a news item that will be "heard around the gas world."

"Mr. A. P. Ewing resigns to act as General Manager of the Highland Park State Bank."

Other items are more or less personal, which mean that they are interesting. If you have not had the pleasure of meeting the genial editor, Mr. Richard C. Fowler, don't wait for introduction to ask for a copy.

Graphite.—Whether your bent is art, literature or speeding, graphite will help. The January issue of the Joseph Dixon Crucible Company bulletin, "Graphite," includes reprints of graphite drawings that will be much admired. The sales hints may be applied to any business. If you use a Dixon pencil write Mr. Geo. E. Long, Vice-President, and ask him to put you on the mailing list.

Monthly Chat.—The monthly magazine, printed for a number of gas companies, including the Brooklyn Union, Westchester Lighting Company, Municipal Gas Company, Cambridge Gas Light Co., and 12 others, is out for February in a cover with portraits of Washington and Lincoln.

The leading article is on "All Gas Kitchens," and there are others on gas fired radiators and on water heating. The editorials are on "Thrift," and this slogan head the page:

"Thrift means
Avoiding waste.
That's what you do
When you burn gas."

Vulcan Bulletin.—The monthly pamphlet issued by the Wm. M. Crane Company tells how you can sell Water Heaters by advertising, and many other things about Vulcan appliances; also a Chinese proverb. We understand and can vouch for the English, but when it comes to the Oriental our pen falters. Send for a copy.

Correspondence.

The JOURNAL is not responsible for the opinions expressed by correspondents.

A Maker's Comments.

WASHINGTON, D. C., January 26th, 1916.

AMERICAN GAS LIGHT JOURNAL, New York.

Sirs:—Please send me another copy of the JOURNAL of the 24th inst. I think Mr. Evans' article "History of the Development of Water Gas" is valuable and interesting, but, I notice several—no doubt unintentional-misleading statements in it. Mr. Evans states that "the MacKenzie and Egner types were similar in principle. In both an attempt was made to secure a continuous production of gas, by carbureting *producer gas* with oil in a coal gas retort." I was quite familiar with the MacKenzie process, for I had the task of dismantling the first and original MacKenzie apparatus, soon after taking charge at Norfolk, Va., in 1877. Mr. Evans was probably misled by one of my earlier pamphlets, and by the illustrations accompanying several of my earlier patents. But, in the "Egner process" there was no attempt to carburet producer gas; for Egner knew a whole lot better than that, before *quite successfully operating his apparatus* at St. Louis, Mo. In the "Egner process" blue water gas was made, the distinguishing feature being, that the generators were heated, *not* by an air blast delivered from a blower; but *by drawing* the necessary air to bring the fuel to incandescence — through, by means of a Root's exhauster. When sufficiently heated, the draft on the generator was shut off, and steam blown through the usual way to make blue or uncarbureted water gas. The latter was then carbureted, as Mr. Evans states, by oil gas made in coal gas retorts. I had two generators, and was the first to introduce up and down runs in a water gas apparatus; also shaking, instead of immovable grates; all of which worked very well. I was the first to use an exhauster, viz. for "Drawing up the heat," instead of "Blowing up." As to this, see page 316, Vol. 51 (Sept. 2nd, 1889), of THE AMERICAN GAS LIGHT JOURNAL, under the caption "Mr. Egner makes a claim." Mr. Loomis had claimed that he was the inventor of this getting-up-the-heat-with-an-exhauster; but my patent had been granted for that before Mr. Loomis's was filed, as the records of the U. S. Pat. Office will show. The Egner process as operated at St. Louis for years, can be seen on page 386 of December 18, 1911, in the AMERICAN GAS LIGHT JOURNAL, with a full description. Mr. Evans also states that "The chief objection to this (the Springer) type is the difficulty of access to the fire for cleaning." As the subscriber had an exceedingly intimate acquaintance with the "Springer" process, he is sorry to have to differ with Mr. Evans as to that "chief objection," which *appeared* so, to the inexperienced observer; but in fact, it was easier to clean a fire in the Springer type, than in almost any other. Springer's original apparatus was a flat failure; and could not be practically operated until the writer was induced to go to Chicago,

May, 1883, and remodel it. Under the title "A Description of a Large Water Gas Apparatus," appearing March 25th, 1889, on page 378, Vol. 50, of THE AMERICAN GAS LIGHT JOURNAL, will be found an account, with three illustrations, of one of the most successful "Springer" apparatus ever operated; though the only thing about it invented by Theodore Springer, was the placing of the fixing chamber over the generator, as Mr. Evans correctly mentions. Quite a number of similar apparatus were employed on the Pacific Coast until comparatively recently, when the Jones' all-crude-oil water gas apparatus displaced nearly everything else.

May I mention one more process quoted in Mr. Evans' paper? The "Rose-Hastings Process" shown by him was not a very good adaptation, but a clear infringement of my U. S. Letters Patent No. 404,404, dated June 4th, 1889, for an "Apparatus for the Manufacture of Fuel and Illuminating Gas." Had the inventor been given a fair chance to work out and operate his invention, he still believes the apparatus would not now be classed with the failures; as several others, among them Dr. Hugo Strache, of Vienna, Austria, who, working the same idea with a differently constructed and assembled apparatus, evolved what he termed "Double-Gas," and claimed it a great success; as mentioned in THE AMERICAN GAS LIGHT JOURNAL at the time, together with a few comments by the writer. Yours sincerely,

FREDERIC EGNER.

Inflammability of Methane-Air Mixtures.

In the Bureau of Mines investigation of the limits of mixtures of methane and air, it was demonstrated that flame will travel upward in mixtures too lean to cause it to travel downward, and will travel horizontally in mixtures containing a percentage of methane intermediate between those which will allow it to travel downward and upward. In mines, a uniform mixture of methane and air seldom forms throughout a large area, nor does the mixture in a particular place remains constant long. Hence the slightly different results obtained under different experimental methods are chiefly of scientific interest. So far as the coal miner is concerned, results obtained for horizontal propagation of flame are of more value than those obtained by ignition from the bottom upward. In a mixture of about 5% of methane ignited from below, the flame would travel to the top, and perhaps then ignite a richer mixture, through which the flame would travel horizontally as long as the methane content was more than 5.5%, and as long as enough oxygen was present to burn the methane. It is generally recognized that the widespread damage produced by explosions in mines, is usually not due to explosive mixtures of methane and air extending throughout the workings, but to the ignition of dust-air mixtures by explosion of a pocket of methane and air.

New Methods and Appliances.

MOVING A 30-INCH GAS MAIN.—To use the open cut method of construction for 2,000 feet of the Lexington avenue subway in Whitlock avenue, Borough of the Bronx, New York city, it was necessary to change the location of 2,000 feet of 30" gas main, 1,450 feet of which was on a curve of 1,200 feet radius, and 550 feet on a tangent; and as the service could be interrupted for only a limited time, the pipe had to be moved quickly.

The 450-Foot Length of Gas Main in New Location.

It was decided to lay new pipe on the curve, and to roll the remaining pipe from the old location to the new. As there was a slight change of direction in the 550-foot length to be moved, it was cut in a 450-foot and 100-foot section.

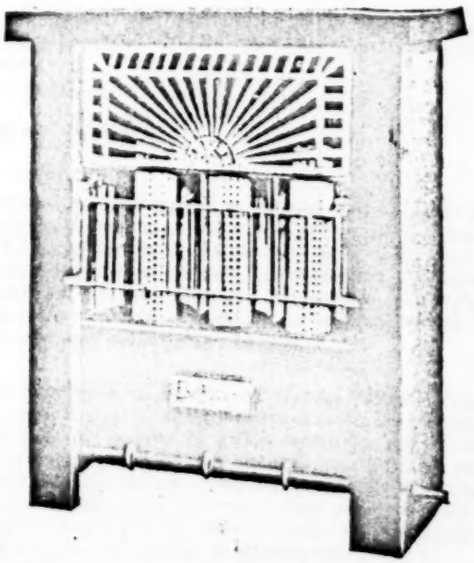
The new location was just outside of the neat line of the subway, and the regular excavation was widened to include the new pipe line. The subgrade for the new position was graded, and bed blocks set to line and grade. Pieces of 12 by 12 timber were then laid across the cut, one timber to reach second length of pipe, and the pipe notched at the breaking points.

After the new pipe was in position on the curve, two cables were placed around the 450-foot length of old pipe, anchored in position on the bank over the new location, passed around the pipe, back to blocks near the anchored end, and then across the cut to other blocks. The hauling was done by two locomotives on track parallel to the line.

The gas was cut off and the pipe broken, and at a given signal the locomotives started pulling, and the pipe rolled over the timber supports to its new position. The actual time of rolling was 25 seconds, and the 100-foot length was put in place in 30 seconds.

The pipe was restored to service after 6 hours, which was well within the time limit. Very little calking was necessary.

FLAMELESS COMBUSTION RADIANT HEATER.—This heater, the "Helios," is described as producing the maximum amount of radiant heat, and is built under the Harding Flameless-Combustion System, employing "a mixture of gas and air in absolutily correct proportion to produce the maximum temperature, notwithstanding that such a mixture is so explosive that it cannot be generally employed with a flame."



The makers say this surface-combustion process is covered by U. S. Patent No. 1,067,983, and employs catalytic flameless combustion, which enables the most explosive mixture of gas and air to be produced and burned continuously and non-explosively. The explosive propagation (or back-firing) of the flame is prevented by passing the mixture in contact with a catalytic structure and producing flameless combustion of part of the mixture before it reaches the flame; thus reducing the calorific value and inflammability of the partially burned mixture, so that the speed of back propagation of flame in the mixture is reduced to less than the velocity produced by the injector action of bunsen burners supplied with gas at ordinary delivery pressure. The mixture, after passing the catalytic structure, being a complete self-burning surface-combustion mixture, can be quickly inflamed and burned with a flame in any closed space and in contact with solid surfaces.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

A FURTHER advance in crude oil was announced by the principal purchasing agencies January 31st, ten cents being added to the important grades, making them as follows:

Pennsylvania crude, $2.35; Cabell, $1.88; Mercer black, Newcastle and Corning, $1.85; Somerset, $1.73. Successive advances over a period of 6 months or more have failed to bring out all the crude oil needed by the refineries, and authorities say they hoped that the new price would prove a stimulus to prompt development in the West Virginia, Western Pennsylvania, and Eastern Ohio fields.

ALONZO P. EWING, has resigned as assistant general manager of the Detroit (Mich.) City Gas Company, and has been elected vice-president and general manager of the Highland Park State Bank, of Detroit, which will be opened for business March 1st. Mr. Ewing came to Detroit 15 years ago from Grand Rapids, where he was employed by the American Light & Traction Co., the holding corporation of the Detroit City Gas Company. He became purchasing agent of the gas company and later took charge of the sale of the corporation's by-products. Subsequently he became sales manager in the commercial department, and three years ago he was appointed assistant general manager. A year later he was elected a director of the company. About a month ago when the directors of the Highland Park State Bank decided to open a banking institution in Detroit, having practically the same stockholders and directors as the Highland Park Bank, President James Couzens, late of the Ford Motor Company, offered the position of general manager to Mr. Ewing because of his unusual business activity and ability as an organizer. When Mr. Ewing went to Detroit, the largest consumer of gas was using about 1,000,000 cubic feet a year. Through his efforts the consumption of gas was greatly increased, the largest consumer now using about 2,000,000 cubic feet daily. There are 50 manufacturing establishments in Detroit, which use in a single month as much gas as was formerly consumed by the whole city in a year. Mr. Ewing's successor has not yet been named.

THE interests of Messrs. E. F. Lloyd and A. G. Lloyd, formerly the controlling factors in the Lloyd Construction Company, Detroit, Mich., have been acquired by A. H. Green, Jr., Warren S. Blauvelt, and F. W. Steere; and a combination made with the working forces of the Steere Engineering Company, specialists in gas engineering. Mr. F. G. Curfman becomes sales manager of the combined companies, having severed his connection with the D. R. Russell Engineering & Development Company, of St. Louis, Mo.

THE U. S. Bureau of Standards, as a result of its recent competative examination, has added to its staff these gas engineers: W. A. Dunkley, formerly plant superintendent of the Atlantic City (N. J.) Gas Company; Charles E. Reinicker, an engineer of the Peoples Gas Light and Coke Company, Chicago; and Walter A. Berry, from the engineering staff of the Portland (Ore.) Gas and Coke Company.

A RESOLUTION, providing for investigation by the Massachusetts Gas and Electric Light Commission and the Industrial Accident Board, of deaths by gas, the expediency of discontinuing pre-payment gas meters, and the adoption of safety devices, has been presented for consideration to the Massachusetts Legislature and referred to the Committee on Public Lighting. The resolution provides that the joint commission make recommendations to the next General Court and draft bills, if deemed advisable.

ANNOUNCEMENT has been made by Manager O. A. Merchant, of the Bangor (Me.) Gas Company, that, commencing this month, gas to large consumers will be cheaper. Formerly, the first 10,000 feet of gas used was sold at $1.40 per 1,000 feet, net. From now on, gas between 5,000 and 10,000 feet costs only $1.30 per 1,000 feet, net. The old price of gas from 10,000 to 20,000 feet was $1.30 per 1,000 net. Now the price of gas in this quantity is $1.20 net. Old prices of gas from 30,000 to 40,000 feet was $1.20; now it is $1.10. There is no change in the price of gas over 40,000 feet. It was $1 net before and it is the same now. For the small consumer, using less than 5,000 feet, it is also the same, $1.40 net.

BUSINESS cares were forgotten on the evening when officials and employees of the Haverhill (Mass.) Gas Light Company observed "ladies" night. The event, which is always looked forward to with pleasant anticipation, was attended by nearly every employee of the various departments, making it one of the most successful in the history of the association. The committee on arrangements included F. Cronin, chairman; Marion Wheland, secretary; George Viens, Sue Hazeltine and George Jones; and every minute was enjoyed by the employees and their invited guests.

A CHARTER of incorporation has been granted to the Union By-Product Coke Company, Buffalo, N. Y., with a capital stock of $1,000,000. Francis S. Lewis, Davenport, Iowa, is to be president of the company; Robert Roberts and Marvin W. Roberts, Evanston, Ill., and Frank B. Baird, president Buffalo Union Furnace Company, are directors. Negotiations are in progress for a site of twenty-one acres on the Buffalo River and the Erie Railroad, immediately adjoining the plant of the Buffalo Union Furnace Company, and if the contemplated arrangements are effected the coke produced will be used by the Furnace Company, and the gas sold elsewhere.

A REARRANGEMENT of the New York engineering staff of the Doherty Organization was put into effect on January 1. Supervision of the different properties by the district engineers has been changed in many instances, and in addition, each district engineer is vested with other powers, as indicated by the titles given. As heretofore, the firm members are the court of final resort, with H. H. Scott, general manager of the operating department, and F. J. Derge chief engineer. The properties will be handled as follows: F. J. Derge, Toledo; R. F. Carbutt, Athens, Durham, Amarillo, Bartlesville, Cumberland, Danbury, Manhattan and Queens and Grand Junction; R. L. Baker, Galveston, Hattiesburg, Meridian, Trumbull, Sedalia, Montgomery, Empire and Ozark. R. G. Griswold, Denver and Spokane; F. C. Weber, Lincoln, Fremont, Mount Vernon, Pueblo, Niagara, Knoxville, Lebanon and Bristol. F. A. Chamberlain, Massillon, Elyria, Hutchingon, Salina, Urban and Summit; F. J. Petura, St. Joseph, St. Joseph and Savanah and Alliance. In addition Mr. Weber will be known as Gas Engineer; Mr. Griswold as Chief Technologist and Rates Engineer; Mr. Carbutt, Railways and Examinations Engineer; Mr. Baker, Electrical Engineer; Mr. Petura, Purchasing Engineer, and Mr. Chamberlain, Construction Accountant. Mr. W. G. Williams is Construction Engineer with supervision of the results engineers and designing engineers.

THE Le Mars (Ia.) Gas Company has instituted injunction proceedings against the mayor and city council to prevent the enforcement of an ordinance reducing the gas rate in Le Mars from $1.40 to $1.30 per 1,000 cubic feet.

ACCORDING to a statement of sales of gas sent to the Philadelphia City Comptroller by the United Gas Improvement Company, the total revenue derived by the city under the terms of the lease of the gas works, since it went into effect in 1897, amounts to $17,095,946.

AT the annual meeting of the Portland (Me.) Gas Light Company the officers and directors were re-elected. They are: President, Col. Fred N. Dow; Vice-President, Wm. H. Moulton; Treasurer, Burton Smart; Assistant Treasurer, Charles D. Fullerton; Corporation Clerk, Burton Smart; Directors, Fred. N. Dow, Wm. H. Moulton, Herbert Payson, Henry G. Beyer, Jr., W. W. Thomas, Charles F. Stockton (city gas agent). The annual report shows these manufacturing figures:

	1915	1914.
Gas manufactured	338,722,000 cu. ft.	311,146,000 cu. ft.
Leakage and unaccounted	22,271,000 cu. ft.	17,709,000 cu. ft.
Gas coal carbonized.....	20,994 tons	16,292 tons.
Enricher oil used.....	357,669 gals.	432,093 gals.
Benzol used.....	402 gals.	571 gals.
Coke and breeze used...	4,458 tons	3,504 tons.
Fuel coal used (gas coal).	326 tons	1,056 tons.

MR. ARTHUR HEWITT, general manager of the Consumers Gas Co., Toronto, has been elected President of the Toronto Board of Trade, the largest and most efficient body of its kind in the Dominion. If Mr. Hewitt administers, and unquestionably he will, the affairs of the Board of Trade as he has those of the Consumers Gas Co., and also the Canadian Gas Association during his several

terms of office, a most successful year is assured. Mr. Hewitt came to Canada in 1881; Entered the service of the Consumers' Gas Company as assistant to the general manager in 1887; became its chief clerk and accountant in 1900; was appointed assistant general manager in 1907; and to his present position in 1909. He was president of the Canadian Gas Association, 1911-1913; is first vice-president National Commercial Gas Association, and a member of the American Gas Institute Committee on Gas Lighting.

A SPECIAL automatic water heater service man is on duty in Birmingham, Ala., to follow up all installations, making at least one visit each month to see that every heater is operating properly. It is believed that this service will be appreciated by consumers and increase the popularity of the automatic water heater. Another service man has also begun similar work in the range field, and will also inspect industrial installations.

THE purchase by eastern capitalists of the Southern California Edison Company's gas plants at Pomona, Long Beach, Venice, Santa Monica, San Pedro, San Dimas, Lordsburg, Ocean Park and Claremont, is officially reported. F. R. Bain, president of the Southern Counties Gas Co., is among the principal contributors to the purchase, and it is understood that the properties will be used in the proposed re-organization and development of the Southern Counties Co. from a $2,000,000 to a $10,000,000 corporation.

THE Canton (Ill.) Gas and Electric Co., at the annual meeting re-elected the old officers, as follows: President, W. H. Parlin; vice-president, W. P. Ingersoll; treasurer, C. B. Ingersoll; secretary and manager, E. H. Negley; directors, W. H. Parlin, W. P. Ingersoll, Miss Clara Parlin and E. H. Negley. The board voted to reduce the price of illuminating gas from $1.35 to $1.10, the same as charged for fuel gas. Hereafter all gas will be furnished through one meter.

MEMBERS of the Progress Club of the Lansing (Mich.) Fuel and Gas Co. at their last meeting elected Earl Smith, vice-president to succeed T. Ordish, resigned. "Efficiency of Distribution Employes" was the subject of a paper read by Roy Durand.

THE Griffin (Ga.) Gas Co., announces that early in the spring it will make additions to its gas mains, extending them to all the factory districts. The contemplated improvements mean the expenditure of several thousand dollars.

THE Dover, Rockaway and Port Oram (N. J.) Gas Company has been turned over formally to the new owners, following the recording of the deed of sale. The property was sold November 8, by Sheriff William H. Thompson, at Morristown, to E. H. Van Wyck, of Cranford, for $110,000, but the sale was not confirmed until last week. William E. McClintock has been placed in charge of the office and plant as a representative of W. P. Brooks & Co., bankers, of New York, they representing A. E. Watson and H. W. McFarland of White River, Vt., holders of the first mortgage bonds. Mr. McFarland appeared before the city council last fall and made certain requests providing the bond holders obtained the property. Among other things, the petitioner asked that a minimum charge be allowed, and that the total amount of production be increased from 125,000 to 150,000 cubic feet before a reduction in price was compulsory.

THE Exposition given by the Lynn (Mass.) Gas and Electric Company closed on Saturday, Jan. 22, and that evening the company entertained the New England Section of the N. C. G. A., at a banquet. Representatives from Boston, Brockton, Cambridge, Newton, Watertown, Dedham and Hyde Park, Lowell, Arlington, Malden, Quincy, Manchester, Nashua, Weymouth and St. Albans, Vt., companies, were present to take part and inspect the show.

AFTER years of discussion, the city and the Springfield (Ills.) Gas and Electric Company have reached an agreement with reference to the settlement of the old gas and light bills, amounting to $45,000 and accruing since 1902. The controversy arose over the city's right to a discount after the 10th of each month. The city did not pay its bills every month, and refused to pay unless allowed the discount. Some time ago settlement was referred to the State Public Utility Commission, and pending the decision of the commission, the company is willing to accept payment on the basis of discounted bills, with the understanding that if the commission upholds the company's contention, the city shall make payment in full.

OLD Dr. Bemis, who was appointed to the Chicago Board of Supervising Engineers in July 1914, has been dismissed by Mayor Thompson.

UTILITIES COMMISSION NEWS.

TOWN BOARD HAS THE AUTHORITY.—The Public Service Commission, Second District, New York, has just received the opinion of the Appellate Division in the appeal of the Niagara & Erie Power Co. from a decision of the Commission, which is of importance to all town authorities and to all persons seeking franchises from them for the approval of the Commission.

The Appellate Division holds that the term "Town Authorities" contained in the law requiring franchises to be secured from them, refers to the Town Board and not to the Superintendent of Highways; and it will hereafter be necessary for franchi. to be sought only from the Town Boards.

For years the Commission has held that the consent of the Town Superintendent of Highways was necessary on a franchise before it for approval, and denied approval of a franchise to the Niagara & Erie Power Co. in the town of Portland, Chautauqua County, because it was not granted by the Town Superintendent of Highways, but only by the Town Board.

Justice Howard, in his opinion for the Appellate Division, characterizes the term used by the Legislature in framing this Act as loose, and says that the question should be definitely decided to avoid confusion. He follows an opinion of Judge Cardozo of the Court of Appeals, which in another case incidentally held that the Town Board constituted the "Town Authorities" under the meaning of the statute.

NO SPECIAL RATES.—According to a decission of the Pennsylvania Public Service Commission, public utility companies cannot furnish lighting survice to churches at a lower rate than to the general public. The decision was a result of the application for the approval of a contract between the Allegheny Valley Light Company and the borough of Parnassus, and states that the rates at which the company agrees to furnish electric light services to the churches in Parnassus are at variance with the rates set forth in the published tariffs of this company on file with the Commision. By the express terms of the law, the filed rates are made the legal rates, and the different rates for this service, especially provided for under the contract submittted for approval, were held to be disriminatory and contrary to the law.

OHIO COMMISSION TO MODIFY APPRAISAL ORDER.—It is expected that the Ohio Public Utilities Commission will shortly issue a modification of its orders that all utility companies make complete appraisals of their properties and file the data with the commission. This can be done under an amendment made to the law last winter. The companies will either have more time in which to do the work, or complete figures will be required only where the commission is asked to fix rates for service or approve them.

MUST GIVE NOTICE OF STOPPING SERVICE.—The New Jersey Board of Public Utility Commissioners has ordered the Wildwood Gas Company not to discontinue service in the future without giving the subscriber at least three days' written notice. It holds that the present practice of arbitrarily discontinuing service without notice is unjust and unreasonable. The company has also been ordered to modify its regulations so that consumers will only be charged the minimum for each entire month and such proportion of the minimum for the first and last month in which service is given as the number of days during which the service is connected bears to the number of days in the month or months. Heretofore consumers have been charged the full monthly minimum. The Wildwood Company supplies Holly Beach, Angleses and Wildwood Crest, seaside resorts.

Financial Notes.

THE influence foreign liquidation may have upon the American security market is of vital interest to investors, and actual figures of such sales are interesting. The foreign sales of CITIES SERVICE COMPANY'S stocks is reported in the "Doherty News." On September 1, 1914, there was $6,384,000, par value, of common stock and $14,013,000, par value, of preferred stock of Cities Service Company among European investors. On January 1, 1916, there was $5,843,000 common stock and $12,425,000 preferred stock still held abroad. These figures are from the transfer books of the company and are accurate, as the company on January 1, 1916, paid a dividend of 9% to both common and preferred stockholders of record December 15, 1915. It will be observed that the amount of common stock sold by foreign investors was but $540,000, par value, and of preferred stock but $1,589,000. Students of foreign liquidation agree generally that America may confidently expect less foreign selling hereafter than during the past 18 months. It is generally believed that the major part of this liquidation has been by institutions, such as banks, insurance companies, etc., where securities are held in large blocks, and that such securities as still remain abroad are in large measure, distributed in moderate amounts among individuals.

THE ATTLEBORO (Mass.) GAS LIGHT COMPANY has petitioned the Gas and Electric Light Commission for approval of an issue of 580 shares of capital stock, at $150 per share. The Citizens' Gas, Electric and Power Company, of Nantucket, has asked the Commission's approval of an issue of 140 shares of stock, at $100 per share.

THE capital stock of the MIDDLETOWN (O.) GAS AND ELECTRIC COMPANY was increased recently from $350,000 to $700,000. This action follows that of the Public Utilities Commission in November, granting permission to the company for the issuance and sale of $143,700 of preferred stock. This stock will be issued with a view of taking care of the various improvements which the company has been making during the past five years. The foremost and most important of these is the new street lighting system, which has been very recently installed. This was done at no small expense to the company, since the fixtures used are of the best and most desirable type obtainable and installed with all possible care and attention. These improvements, with the annual depreciation on material and working stock on hand, make necessary the reimbursement, consequently the issuance of stock.

FOLLOWING its policy of simplifying its organization, the COMMONWEALTH POWER, RAILWAY AND LIGHT COMPANY has merged title to its Michigan gas properties into the Michigan Light Company, formerly organized under New Jersey Laws, now organized as a Michigan corporation, with a capitalization of $2,144,000 preferred and $2,500,000 common stock; and the local corporations have been dissolved. The company has asked for authority to issue $3,000,000 bonds, and these bonds will be used in refunding the bonds on the individual properties when they shall become due, and for financing new construction and improvements. The largest improvement contemplated will be the building of a new gas plant at Manistee. The reorganization does not involve any increase in the capitalization except to meet the new construction requirements. The gas properties owned are located at Kalamazoo, Jackson, Flint, Pontiac, Saginaw, Bay City and Manistee.

PURSUANT to the provisions of the Collateral Trust Agreement executed December 1, 1911, by the STANDARD GAS & ELECTRIC COMPANY to the Philadelphia Trust Company, as Trustee, to secure an authorized issue of $30,000,000 Convertible Sinking Fund Gold Bonds, maturing December 2, 1926, the company has given notice that it has now on hand the sum of $810,700 (being the proceeds of the sale of certain bonds heretofore held as a part of the collateral under said Trust Agreement, to wit, $206,000 Ottumway Railway and Light Company First and Refunding 5's, at 90, and $676,000 Western States Gas and Electric Company (Cal.) First and Refunding 5% bonds, at 92½), and that it is its intention to apply said sum of $810,700, to the purchase of outstanding Standard Gas and Electric Company convertible 6% bonds. Offers of bonds are invited, at a price no to exceed 105 and accrued interest. Sealed tenders should be addressed to the Philadelphia Trust Company, Trustee, 415 Chestnut street, Philadelphia, and will be received until 3 P.M. Thursday, February 17, 1916

TOTAL gross operating revenue of the PACIFIC GAS AND ELECRIC COMPANY for the 12 months ended Dec. 31, 1915, was $18,530,301, an increase of $1,617,613 over 1914, and the surplus for dividends increased $1,567,100. After preferred dividends, the total unappropriated surplus was $3,212,049. The income account for the full 12 months follows:

Gross operating revenue—	1915.	Increase.
Electric department	$9,924,482	$1,165,033
Gas department	7,560,185	544,777
Other departments	1,045,633	.....
Gross operating revenue	18,530,301	1,617,613
Total expenses	10,585,592	671,671
Total net income	8,358,587	1,052,005
Bond interest	3,982,418	92,077
Balance	4,373,176	1,257,996
Surplus	4,212,766	1,567,100
Surplus unappropriated	3,212,049	1,181,367
Total dividends	1,000,716	385,733

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